TOCDF
2002 Environmental Monitoring Follow-On Study
Model for Evaluating Long-Term Environmental Monitoring Effects at Chemical Demilitarization Facilities

Introduction

- Location
  - Tooele Chemical Demilitarization Facility (TOCDF), UT
- Purpose & Scope
  - Evaluate chemical concentrations in the local environment prior to facility operation (Establish Baseline).
  - Periodically collect and analyze environmental data to compare concentrations to baseline during the operational period of the Facility.
  - Evaluate subsequent follow-on data to identify spatial & temporal trends.

TECHNICAL HIGHLIGHTS

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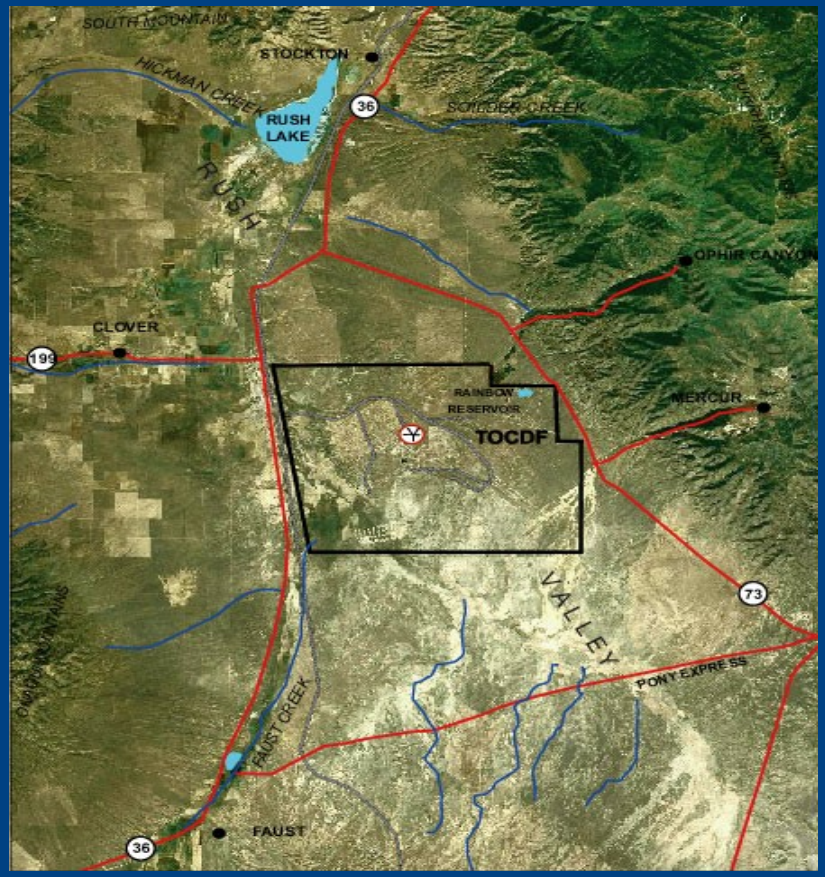
- Environmental Statistics
- Sample Strategy
- Planning & Logistics
- Data Management
- Evaluation of Results
- Data Presentation



Study Methodology

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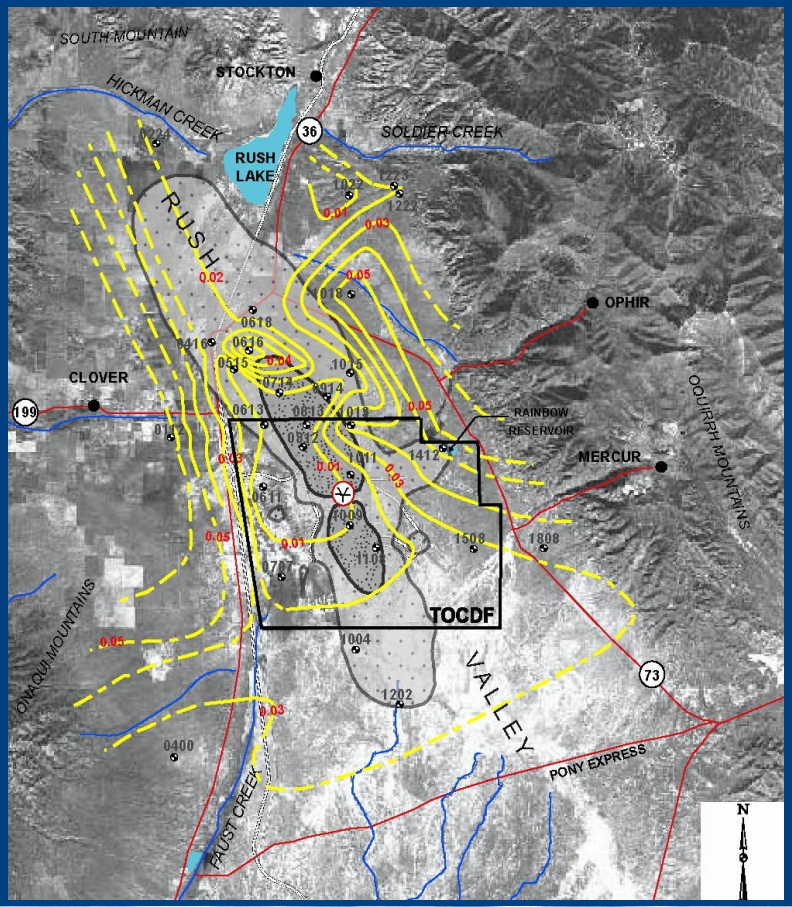
- Sample Media
  - Soil, Vegetation (shrubs/herbaceous), Water, Sediment
- Sample Locations & Quantity
  - 28 Sites for Soil / Vegetation & surface water
- Analytes & Lab Protocols
  - CLP Methodology
- Physical Site Characteristics
- Sample Collection Schedule
  - Month of May, Bi-Annually
- Spatial & Temporal Analysis
  - Air Dispersion / Particulate Deposition Model
- Planning & Logistics



Statistical Analysis – Flow Diagram

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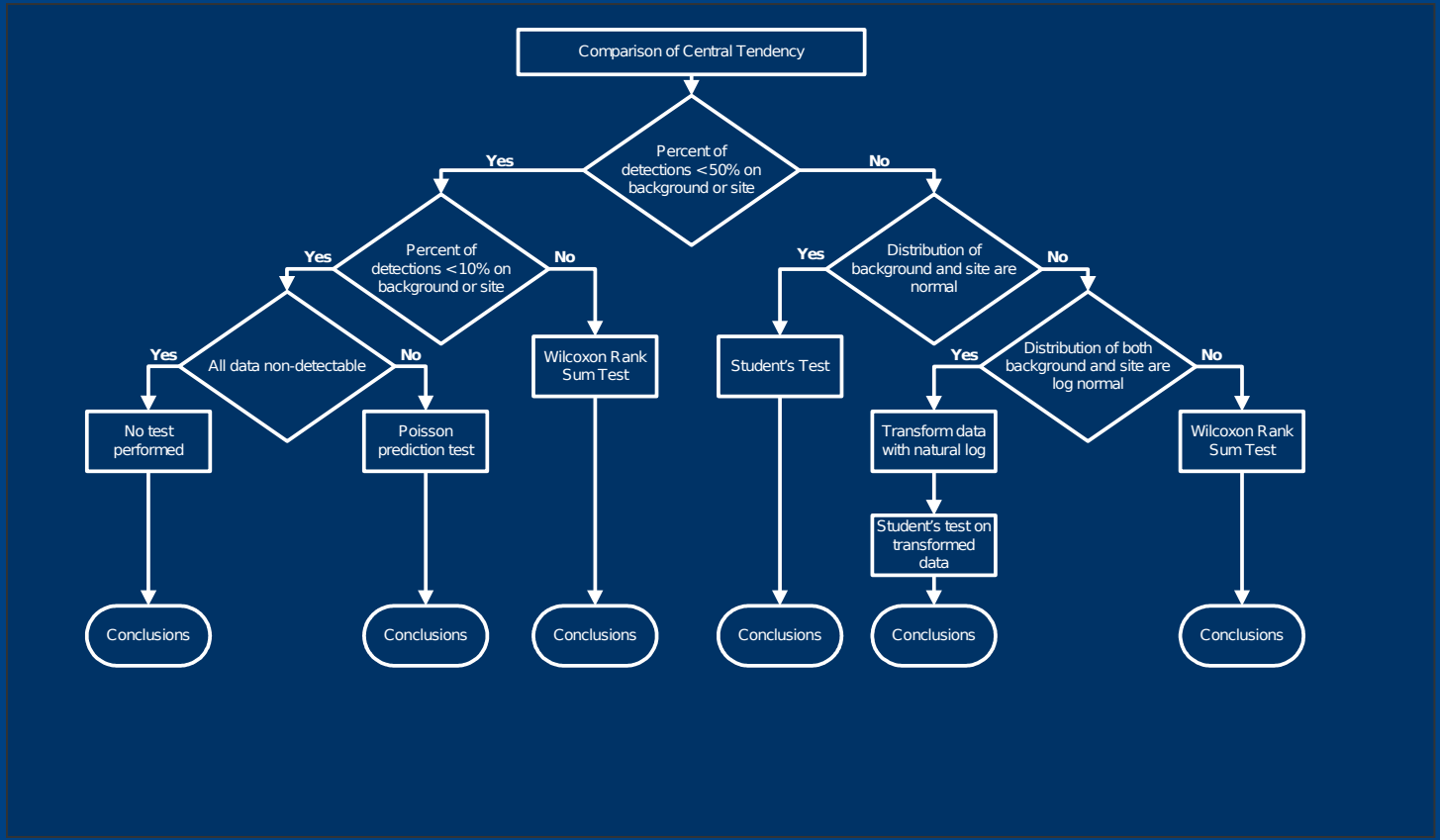

2002 EMFS Results

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- Physical Characterization of Sample Locations
- Evaluation of Analytical Data
- Inconclusive
  - Unchanged
  - Below detection limit
- Vegetation Composition & Structure
  - Shrub Layer Characterization
  - Herbaceous Layer Characterization
- Data Management
  - Databases
- Data Presentation

Pie-Chart

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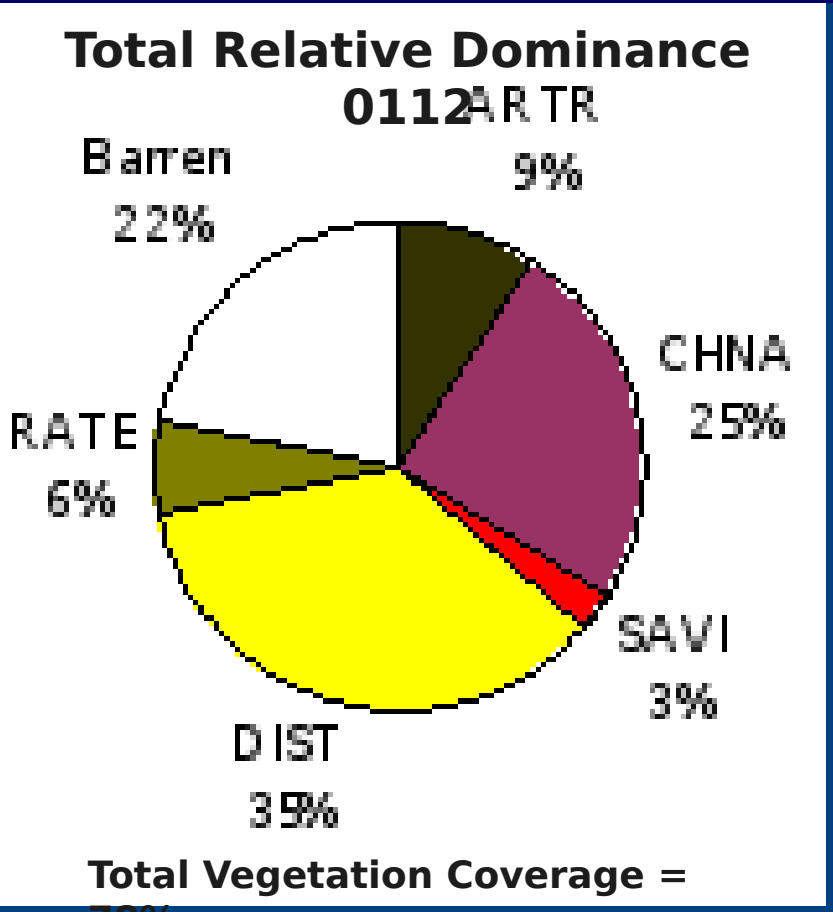

Forage Value

1 - Good

- AGDE = Wheatgrass
- AGTR = Slender wheatgrass
- ORHE = Indian rice grass
- POSE = Sandberg bluegrass
- STCM = Needle-and-thread
- ATCO = Shadescale
- ATCA = Four-wing saltbush

2 - Fair

- BRTE = Cheatgrass
- DIST = Desert Saltgrass
- LEPE = Shield peppergrass
- SHIY = Squirreltail
- VIAM = American vetch

3 - Poor

- ALAL = Yellow alyssum
- RATE = Bur buttercup
- ARTR = Big sagebrush
- CHNA = Grey rabbitbrush
- JUOS = Utah Juniper

4 - Poisonous

- SAVI = Greasewood

Barren Ground

Histogram

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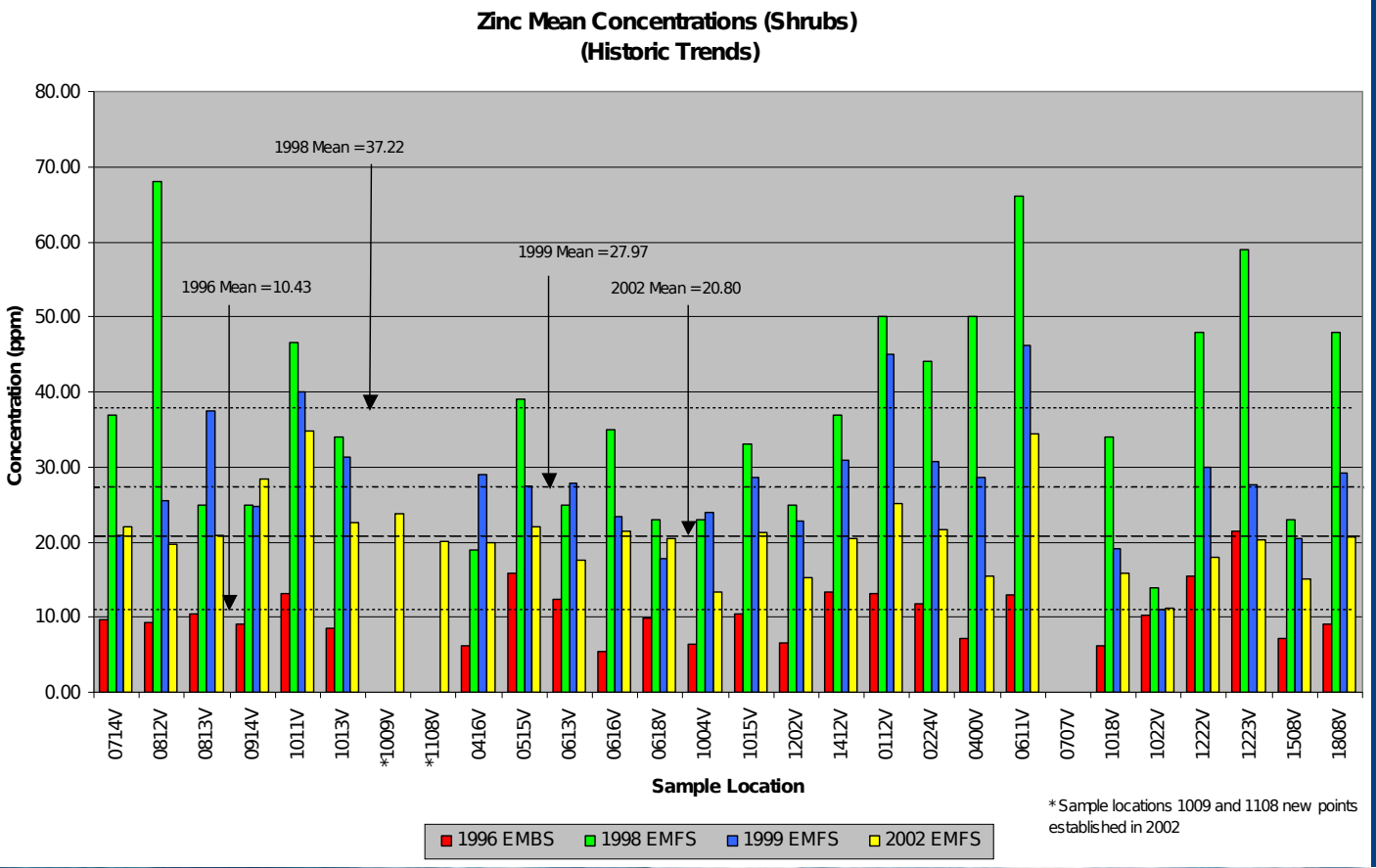
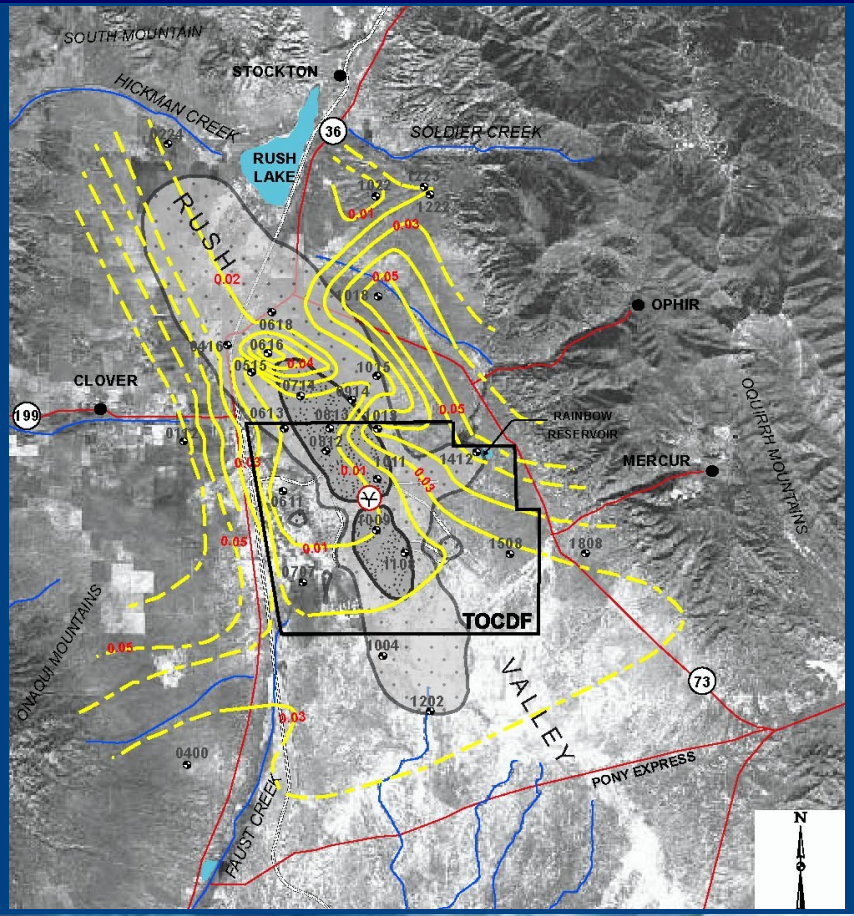


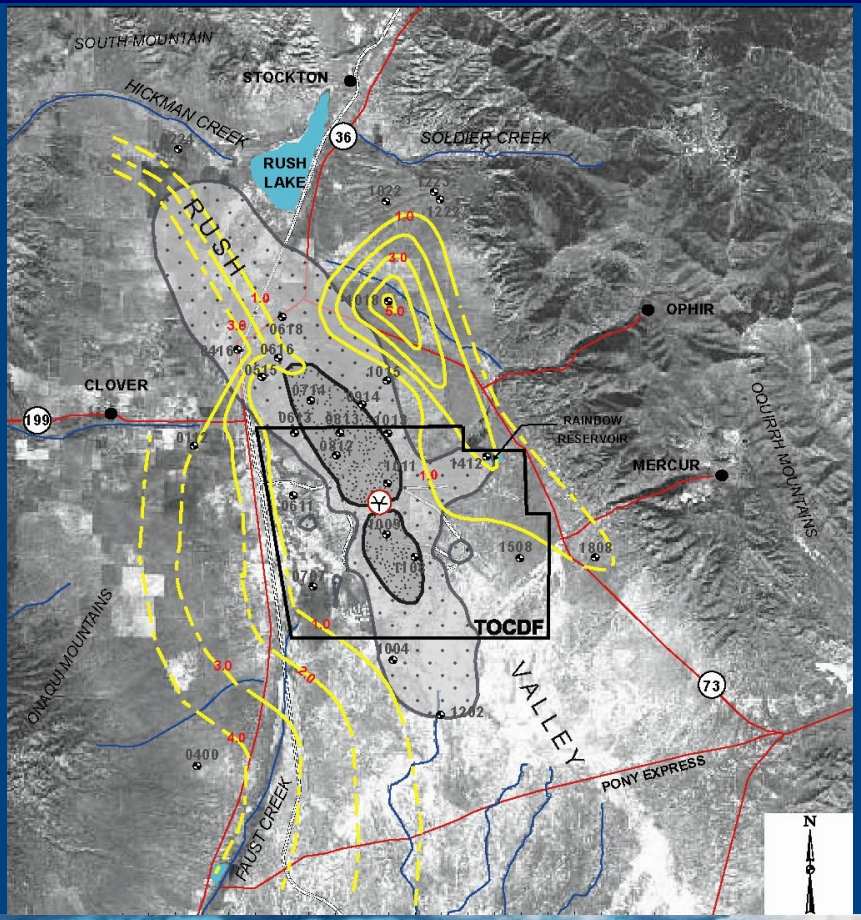
Contour Trends – Example 1



Surface Soil - Mercury

- East-West Trend.
- High Concentrations towards the Mountains.
- Low Concentrations in the Valley.

Contour Trends – Example 2



Surface Soil – Benzene

- No Apparent Relation to the Facility.
- Non-Detects in the Valley.

Evaluation of Analytical Results

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- Surface Soil Data Evaluation
  - Statistical Results for:
    - Metals - Antimony, Arsenic, Mercury, Thallium
    - Dioxin/Furan – OCDD, OCDF, HPCDD, HPCDF, HXCDD, HXCDF, PECDD, PECDF, TCDD, TCDF
    - VOCs – Benzene, Toluene, 1,1-Dichloroethene

Evaluation of Analytical Results

- Shrub & Herbaceous Vegetation
  - Statistical Results for:
    - Metals – Cadmium, Chromium, Copper, Mercury, Molybdenum, Vanadium, Manganese, Barium, Zinc.
    - Dioxin/Furan
    - SVOCs – Benzyl Alcohol

Conclusions

- 2002 EMFS Conclusions
  - No identifiable impact to environment from TOCDF operations
  - Comparison to natural conditions
    - Range Fire impacts
    - Metal rich mining province
  - Significant anthropogenic disturbance in valley

Lessons Learned

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- Political & Economic Considerations
  - State DEQ
  - Public Involvement
  - Budgetary Restrictions
- Technical Changes Through Time
  - Detection Limits
  - Modeling / Computer Capabilities
- Virtual Office
  - Use of technical experts
  - Data Management
  - Field Personnel
- Improvements to Statistical Evaluation

Questions

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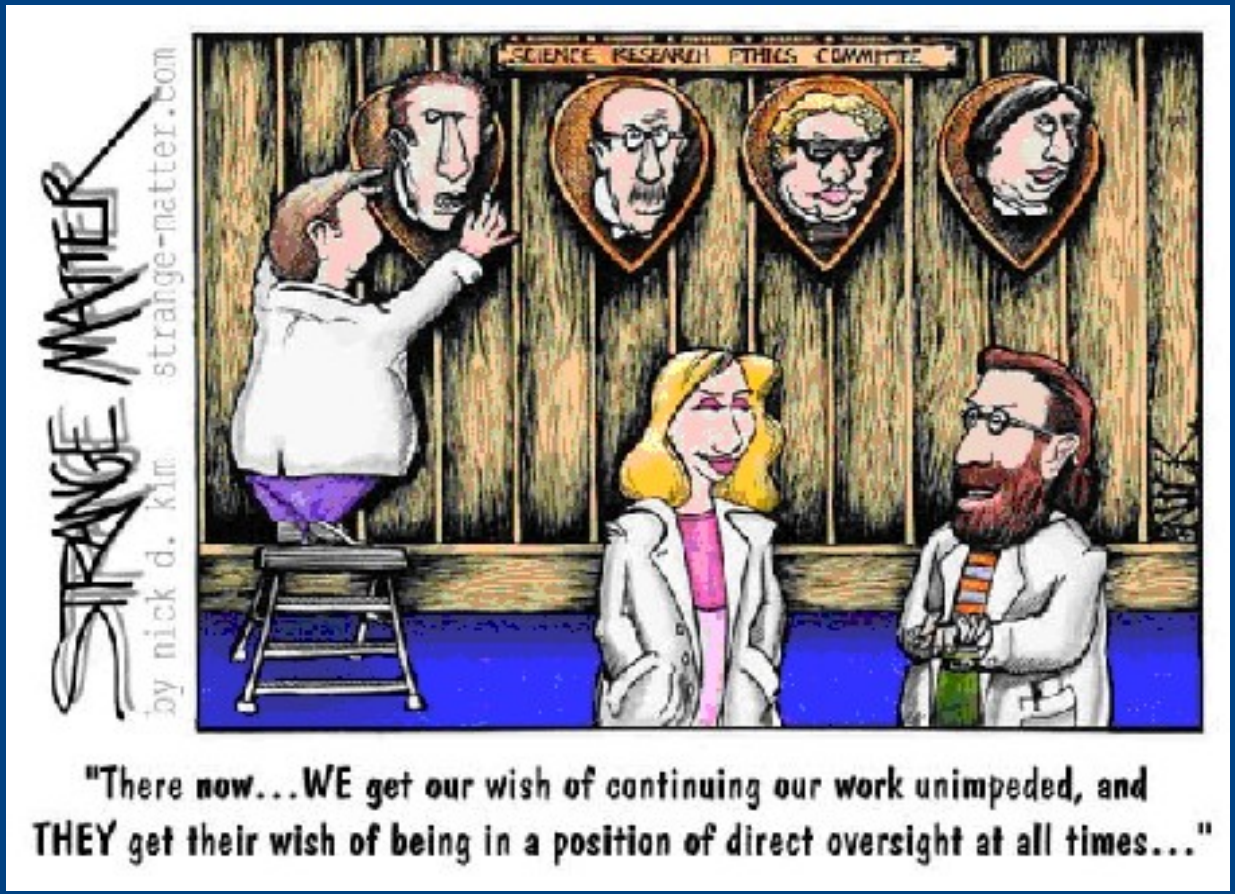
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by nick d. kim strange-matter.com
"There now...WE get our wish of continuing our work unimpeded, and THEY get their wish of being in a position of direct oversight at all times..."